



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : WEAVER et al.
SERIAL NO : 10/613,633
FILED : July 3, 2003
TITLE : WATER-SOLUBLE GLOBULIN CONCENTRATE FOR
IMPROVING GROWTH IN ANIMALS

Grp./A.U. : 1644
Examiner : Y. KIM
Docket No. : 1828.023US2

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Mail Stop
Alexandria, VA 22313-1450

Dear Sir:

I, Joy M. Campbell, declare the following:

1. That I am a nutritionist for APC Inc., the assignee for the above-identified patent application. I graduated in 1989 with a Bachelor of Science degree in Dairy Science from Iowa State University, Ames, IA, and in 1992 with a Masters of Science Degree in Animal Sciences from the University of Illinois at Urbana-Champaign, Urbana, IL. I also graduated in 1996 with a Doctorate in Nutritional Sciences from the University of Illinois at Urbana-Champaign, Urbana, IL;

2. That I have been working in the field of Nutritional Science since 1996. My background, work experience, publications, and expertise are described in my curriculum vitae (attached Exhibit A), which I incorporate by reference. Furthermore, I was recently awarded with the ASAS/ADSA Outstanding Young Agribusiness Award, 2003;

3. That I am familiar with the above-identified patent application and with the Office Action mailed June 29, 2006.

4. That the benefit of adding the plasma product via water was depicted in broiler studies. Two studies were conducted under my direction utilizing Ross x Ross 308 male broilers. The plasma product was included in the feed or water resulting in similar consumption of plasma by the chicks. During the first week in experiment one, average plasma product consumptions were 0.82, 0.91, and 1.71 g/d (grams/day) for feed, water, or feed plus water delivery methods. The results for days 0 to 7 average daily gain (ADG) are reported in Table 1;

Table 1. Least squares means of average daily gain (days 0 to 7) of broilers fed plasma product in feed or water.

	Plasma Inclusion Level, %				
	0	3.5	0	3.5	
Feed	0	3.5	0	3.5	SEM ¹
Water	0	0	1.35	1.35	
Exp. ² 1					
ADG ³ , g/d	18.95 ^a	19.21 ^a	20.97 ^b	20.41 ^b	0.26
Exp. 2					
ADG, g/d	16.22 ^a	17.32 ^b	19.86 ^c	18.98 ^c	0.32

^{abc}Means in the same row with different superscript differ ($P < 0.05$).

¹SEM = standard error of mean.

²Exp. = Experiment.

³ADG = average daily gain.


5. That during the second experiment, plasma product intakes were 0.77, 1.14, and 1.83 g/d for feed, water, or feed plus water delivery methods. The results for days 0 to 7 ADG are reported in Table 1;

6. That averaged across both experiments, the addition of plasma to the feed resulted in a minimal improvement in ADG (4.2% improvement). Statistically, the addition of plasma to the feed resulted in a 6.8% improvement ($P < 0.05$) in ADG in Exp. 2, but no improvement in ADG in Exp. 1. Addition of plasma to the drinking water improved ($P < 0.05$) ADG in both experiments (10.6% Exp. 1 and 22.4% Exp. 2). The addition of plasma to both the drinking water and feed did not further improve ADG compared to that of water only ($P < 0.05$);

7. That addition of plasma to the feed tends to result in minimal improvement in ADG (1.4% Exp. 1 and 6.8% Exp. 2). However, addition of plasma to the drinking water results in a more consistent improvement in ADG (10.6% Exp. 1 and 22.4% Exp. 2);

8. That the undersigned further declares that all statements made herein of her own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Date: 9-8-06


Joy M. Campbell, Ph.D.

Joy M. Campbell

Education

- Ph.D. Nutritional Sciences University of Illinois at Urbana-Champaign - 1996
Thesis Title: Influence of oligosaccharides and fish oil on gastrointestinal tract characteristics and metabolic profiles of humans, pigs, and rats.
Advisor: Dr. George C. Fahey, Jr. GPA: 5.0/5.0
- M.S. Animal Sciences University of Illinois at Urbana-Champaign - 1992
Thesis Title: Niacin kinetics in lactating dairy cattle supplemented with nicotinic acid or nicotinamide.
Advisor: Dr. Michael R. Murphy GPA: 5.0/5.0
- B.S. Dairy Science Iowa State University, Ames, IA - 1989
Advisor: Dr. M. Douglas Kenealy GPA: 3.3/4.0

Work Experience

- 4/97 - present Nutritionist: APC Inc., Ankeny, IA
Research and product development and technical service towards animal health and nutrition in multiple species both domestically and internationally.
- 6/96- 4/97 Postdoctoral Associate: Swine Nutrition, Iowa State University, Ames, IA
Nutritional research of value-added corn for swine nutrition working with Dr. Tim Stahly.
- 1/95 - 5/95 Teaching Assistant: Agronomy Department, University of Illinois at Urbana-Champaign, Urbana, IL
Graduate course: Design and Analysis of Biological Experiments
- 8/93 -12/93 Teaching Assistant: Animal Science Department, University of Illinois at Urbana-Champaign, Urbana, IL
Graduate course: Techniques in Animal Nutrition Research
- 1/90 - 5/90 Pet Food Nutrition Internship: Calreco, Inc., Van Nuys, CA
Nutrition technician assisting with research projects, animal (cat) care, and management of palatability trial input and distribution using a computerized record keeping system
- 1/88 - 12/89 Lab Assistant: Ruminant Nutrition, Iowa State University, Ames, IA
Various laboratory analyses, sample collection, and conducting an independent research trial
- 8/87 - 12/87 Animal Caretaker/Records Assistant: Iowa State University Dairy Farm, Ames, IA
Animal care and animal record keeping
- 5/87 - 8/87 Assistant Herdsman: Maddox Dairy, Burrell, CA
Animal care and herd health of dairy



5/86 - 8/86 Sales Clerk: Crossroads Feed Service, Beebeetown, IA
Customer service with products and cash register

Honors and Awards

Post-graduate

- ASAS/ADSA Outstanding Young Agribusiness Award, 2003

at University of Illinois

- Jonathan Baldwin Turner Graduate Fellowship, 1992-95
- University Fellowship, 1991-92
- Research Assistantship, 1990-91

at Iowa State University

- Graduated with Honors from ISU, 1989
- Margaret L. Weatherspoon Scholarship, 1989
- Lyle B. McBride III Scholarship, 1989
- O.R. Bentley Scholarship, 1989
- George Gund Independent Study Scholarship, 1988
- Outstanding Sophomore and Senior in Dairy Science, 1988, 1989
- Thorvald J. Andersen Scholarship, 1987, 1988
- College of Agriculture Scholarship, 1986
- ISU Dairy Special Youth Fund Award, 1986
- Admitted to ISU with Recognition and Award, 1986

Professional and Honorary Societies

- American Institute of Nutrition
- American Society of Animal Science
- American Dairy Science Association
- American Association of Swine Veterinarians
- Poultry Science
- World Aquaculture Society
- American Chemical Society
- Sigma Xi
- Gamma Sigma Delta
- Alpha Zeta
- Sigma Alpha
- ISU Honors Program

Post Graduate Professional Training

- Fundamentals of Immunology
- Patent Law Class
- Advanced Excel Training
- Communication and Interpersonal Skills: A Seminar for IT and Technical Professionals

Publication Record

Peer-Reviewed Journal Articles

- Campbell, J.M., M.R. Murphy, R.A. Christensen, and T.R. Overton. 1994. Kinetics of niacin supplements in lactating dairy cows. *J. Dairy Sci.* 77:566-575.
- Pollack, J., J.M. Campbell, S.M. Potter, and J.W. Erdman, Jr. 1994. Mongolian gerbils (*Meriones unguiculatus*) absorb β -carotene intact from a test meal. *J. Nutr.* 124:869-873.
- Campbell, J.M., L.L. Bauer, G.C. Fahey, Jr., A.J.C.L. Hogarth, B.W. Wolf, and D.E. Hunter. 1997. Selected fructooligosaccharide (1-ketose, nystose, and 1^F- β -fructofuranosylnystose) composition of foods and feeds. *J. Agric. Food Chem.* 45:3076-3082.
- Campbell, J.M., G.C. Fahey, Jr., and B.W. Wolf. 1997. Selected indigestible oligosaccharides affect large bowel mass, cecal and fecal short chain fatty acids, pH, and microflora in rats. *J. Nutr.* 127:130-136.
- Campbell, J.M., G.C. Fahey, Jr., C.A. Lichtensteiger, S.J. DeMichele, and K.A. Garleb. 1997. An enteral formula containing fish oil, indigestible oligosaccharides, gum arabic, and antioxidants affect plasma and colonic phospholipid fatty acid and prostaglandin profiles in pigs. *J. Nutr.* 127:137-145.
- Campbell, J.M., G.C. Fahey, Jr., S.J. DeMichele, and K.A. Garleb. 1997. Metabolic characteristics of healthy adult males as affected by ingestion of a liquid nutritional formula containing fish oil, oligosaccharides, gum arabic, and antioxidant vitamins. *Food and Chemical Toxicology* 35:1165-1176.
- Campbell, J.M. and G.C. Fahey, Jr. 1997. Psyllium and methylcellulose fermentation properties in relation to insoluble and soluble fiber standards. *Nutr. Res.* 17:619-629
- Campbell, J.M., E.A. Flickinger, and G.C. Fahey, Jr. 1997. A comparative study of dietary fiber methodologies using pulsed electrochemical detection of monosaccharide constituents. *Seminars in Food Analysis* 2:43-53.
- Flickinger, E.A., J.M. Campbell, L.G. Schmitt, and G.C. Fahey, Jr. 1998. Selected lignosulfate fractions affect growth performance, digestibility, and cecal and colonic properties in rats. *J. Anim. Sci.* 76:1626-1635.
- Hussein, H.S., J.M. Campbell, L.L. Bauer, G.C. Fahey, Jr., A.J.C.L. Hogarth, B.W. Wolf, and D.E. Hunter. 1998. Selected fructooligosaccharide composition of petfood ingredients. *J. Nutr.* 128:2803S-2805S.
- Erickson, P.S., M.S. Murphy, J.M. Campbell, and S.W. Nombekela. 2000. Lasalocid supplementation of dairy cow diets in early lactation. *Professional Animal Scientist* 16:196-201.

- Jiang, R., X. Chang, B. Stoll, K.J. Ellis, R.J. Shypailo, E. Weaver, J. Campbell, and D.G. Burrin. 2000. Dietary plasma protein is used more efficiently than extruded soy protein for lean tissue growth in early-weaned pigs. *J. Nutr.* 130:2016-2019.
- Jiang, R., X. Chang, B. Stoll, M.Z. Fan, J. Arthington, E. Weaver, J. Campbell, and D.G. Burrin. 2000. Dietary plasma protein reduces small intestinal growth and lamina propria cell density in early weaned pigs. *J. Nutr.* 130:21-26.
- Steidinger, M.U., R.D. Goodband, M.D. Tokach, S.S. Dritz, J.L. Nelssen, L.J. McKinney, B.S. Borg, and J.M. Campbell. 2000. Effects of pelleting and pellet conditioning temperatures on weaning pig performance. *J. Anim. Sci.* 78:3014-3018.
- Steidinger, M.U., R.D. Goodband, M.D. Tokach, J.L. Nelssen, S.S. Dritz, B.S. Borg, and J.M. Campbell. 2002. Effects of providing a water-soluble globulin in drinking water and diet complexity on the growth performance of weanling pigs. *J. Anim. Sci.* 80:3065-3072.
- Campbell, J.M., J.D. Quigley, L.E. Russell, and M.T. Kidd. 2003. Effect of spray-dried bovine serum on intake, health and growth of broilers housed in different environments. *J. Anim. Sci.* 81:2776-2782.
- Quigley, J.D., III, J.M. Campbell, J. Polo, and L.E. Russell. 2004. Effects of spray-dried animal plasma on intake and apparent digestibility in dogs. *J. Anim. Sci.* 82:1685-1692.
- Kerr, B.J., M.T. Kidd, J.A. Cuaron, K.L. Bryant, T.M. Parr, C.V. Maxwell, and J.M. Campbell. 2004. Isoleucine requirements and ratios in starting (7 to 11 kg) pigs. *J. Anim. Sci.* 82:2333-2342.
- Campbell, J.M., J.D. Quigley, III, L.E. Russell, and L.D. Koehn. 2004. Efficacy of spray-dried bovine serum on health and performance of turkeys challenged with *Pasteurella multocida*. *J. Appl. Poult. Res.* 13:388-393.
- Campbell, J.M., J.D. Quigley, III, and L.E. Russell. 2004. Impact of spray-dried bovine serum and environment on turkey performance. *Poult. Sci.* 83:1683-1687.
- Pérez-Bosque, A., C. Pelegrí, M. Vicario, M. Castell, L. Russell, J.M. Campbell, J.D. Quigley, III, J. Polo, C. Amat, and M. Moretó. 2004. Dietary plasma protein affects the immune response of weaned rats challenged with *S. aureus* superantigen B. *J. Nutr.* 134:2667-2672.
- Garriga, C., A. Pérez-Bosque, C. Amat, J.M. Campbell, L. Russell, J. Polo, J.M. Planas, and M. Moretó. 2005. Spray-dried porcine plasma reduces the effects of Staphylococcal Enterotoxin B on glucose transport in rat intestine. *J. Nutr.* 135:1653-1658.
- Polo, J., J.D. Quigley, L.E. Russell, J.M. Campbell, J. Pujols, and P.D. Lukert. 2005. Efficacy of spray-drying to reduce infectivity of pseudorabies and porcine reproductive and respiratory syndrome (PRRS) viruses and seroconversion in pigs fed diets containing spray-dried animal plasma. *J. Anim. Sci.* 83:1933-1938.

Bregendahl, K., D.U. Ahn, D.W. Trampel, and J.M. Campbell. 2005. Effects of dietary spray-dried bovine plasma protein on broiler growth performance and breast-meat yield. *J. Appl. Poult. Res.* 14:560-568.

Escobar, J., T.L. Toepfer-Berg, J. Chen, W.G. Van Alstine, J.M. Campbell, and R.W. Johnson. 2006. Supplementing drinking water with Solutein did not mitigate acute morbidity effects of porcine reproductive and respiratory syndrome virus in nursery pigs. *J. Anim. Sci.* 84:2101-2109.

Campbell, J.M., L.E. Russell, J.D. Crenshaw, K.C. Behnke, and P.M. Clark. 2006. Growth response of broilers to spray-dried plasma in pelleted or expanded feed processed at high temperature. *J. Anim. Sci.* 84:2501-2508.

Proceedings Papers

Campbell, J.M., E. Weaver, L. Russell, and F. Chi. 1998. Impact of spray-dried plasma on post-weaning diarrhea and performance in weanling pigs. *American Association of Swine Practitioners.* Pp. 223-227.

Borg, B.S., J.M. Campbell, H. Koehnke, L.E. Russell, D.U. Thomson, and E.M. Weaver. 1999. Effects of a water soluble plasma protein product on weanling pig performance and health with and without *Escherichia coli* challenge. *Allen D. Leman Swine Conference* 26:23-24.

Borg, B.S. and J.M. Campbell. 2000. Opportunities for reducing group weight variation through strategic use of Solutein™ in the nursery. *Allen D. Leman Swine Conference* 27:19-20.

Campbell, J.M. and B.S. Borg. 2000. Benefits derived from swine diets containing plasma in *Escherichia coli* challenged pigs. *American Association of Swine Practitioners.* Pp. 129-131.

Borg, B.S. and J.M. Campbell. 2001. Effects of Solutein™ application to various weight classes of young weaned pigs. *American Association of Swine Veterinarians.* Pp. 207-210.

Campbell, J.M., B.S. Borg, J. Polo, and R. Conde. 2001. Impact of spray-dried plasma (Appetein) and colistin in weanling pigs challenged with *Escherichia coli*. *Allen D. Leman Swine Conference* 28:7.

Borg, B.S., J.M. Campbell, J. Polo, L.E. Russell, C. Rodriguez, and J. Rodenas. 2002. Evaluation of the chemical and biological characteristics of spray-dried plasma protein collected from various locations around the world. *American Association of Swine Veterinarians.* Pp. 97-100.

Quigley, J.D., J.M. Campbell, L.E. Russell, E. Robert, and J. Polo. 2002. Effects of spray-dried plasma in the diets of companion animals. *Proceedings of the 2002 Petfood Forum.*

Crenshaw, J.D., J.M. Campbell, and D. Quam. 2003. Evidence of gastric ulcer tissue repair in swine offered Solutein™ via the water. *American Association of Swine Veterinarians.* Pp. 105-109.

- Quigley, J.D., J.M. Campbell, J.D. Crenshaw, L.E. Russell, and J. Polo. 2003. Effects of spray-dried animal plasma on intestinal health of weaned pigs challenged with *Escherichia coli*. Proc. 9th International Symposium on Digestive Physiology in Pigs 2:75-77.
- Campbell, J.M., J.D. Quigley, J.D. Crenshaw, L.E. Russell, and J. Polo. 2003. Effects of spray-dried animal plasma on enteric tissue growth following challenge. Proc. 9th International Symposium on Digestive Physiology in Pigs 2:189-191.
- Campbell, J.M., J.D. Crenshaw, J.D. Quigley, J. Polo, and L.E. Russell. 2003. Effect of spray-dried plasma protein on pig performance, carcass value, and production economics in a wean-to-finish trial. Allen D. Leman Swine Conference 30:23.
- Quigley, J.D., J.M. Campbell, C.J. Hammer, J.D. Crenshaw, L.E. Russell, and J. Polo. 2004. Os efeitos do plasma produzido por "spray-dry" nas dietas de suínos e aves. CBNA March 25-26, 2004. Cascavel, PR pp. 183-196.
- Crenshaw, J.D., J.M. Campbell, L.E. Russell, and R.D. Boyd. 2004. Effect of spray-dried animal plasma in lactation feed in a segregated-parity sow herd. Allen D. Leman Swine Conference 31:33.
- Crenshaw, J.D., J.M. Campbell, L.E. Russell, B.K. Allen, J. Polo, and R.D. Boyd. 2004. Impact of spray-dried plasma proteins on immune system modulation. 20th Annual Carolina Swine Nutrition Conference. pp. 27-36.
- Crenshaw, J.D., J.M. Campbell, L.E. Russell, and J. Polo. 2004. Proteínas plasmáticas: Mecanismo de ação e uso em leitões, porcas e frangos de corte. CBNA November 10-12, 2004. Campinas, SP pp. 221-236.
- Campbell, J.M., T. Donovan, D. Boyd, L. Russell, and J. Crenshaw. 2006. Use of statistical process control analysis to evaluate the effects of spray-dried plasma in gestation and lactation feed on sow productivity in a PRRS-unstable farm. American Association of Swine Veterinarians. pp. 139-142.

Abstracts at Professional Meetings

- Beck, A.M., J.R. Russell, J.M. Campbell, and M.R. Brasche. 1990. Grazing system effects on beef cow-calf production from alfalfa-grass pasture. J. Anim. Sci. 68 (Suppl. 1):576.
- Campbell, J.M., S.M. Potter, and J.W. Erdman, Jr. 1993. Absorption of β -carotene by the Mongolian gerbil (*Meriones unguiculatus*). FASEB J. 7:A3021.
- Murphy, M.R., J.M. Campbell, S.W. Nombekela, and P.S. Erickson. 1993. Effect of lasalocid on dairy cows in early lactation. J. Dairy Sci. 76(Suppl. 1):279.
- Campbell, J.M., M.R. Murphy, R.A. Christensen, and T.R. Overton. 1993. Niacin supplement kinetics in lactating dairy cattle. J. Dairy Sci. 76(Suppl. 1):299.

- Campbell, J.M., G.C. Fahey, Jr., C.A. Lichtensteiger, K.A. Garleb, and S.J. DeMichele. 1995. Effects of an ulcerative colitis nutritional formula (UCNF) on cecal and colonic mucosal prostaglandin (PG) synthesis in pigs. *Gastroenterology* 108:A789.
- Campbell, J.M., G.C. Fahey, Jr., K.A. Garleb, and S.J. DeMichele. 1995. Safety and tolerance of an ulcerative colitis nutritional formula (UCNF) in healthy adults. *Gastroenterology* 108:A789.
- Fahey, G.C., Jr., J.M. Campbell, and E.A. Flickinger. 1996. Comparison of dietary fiber methodologies using selected fibrous ingredients and foodstuffs as substrates. *FASEB J.* 10:A524.
- Campbell, J.M., G.C. Fahey, Jr., and B.W. Wolf. 1996. Oligosaccharides affect cecal and colonic short chain fatty acids, pH, and microflora in rats. *FASEB J.* 10:A772.
- Flickinger, E.A., J.M. Campbell, G.C. Fahey, Jr., A.J.C.L. Hogarth, K.A. Garleb, W.A. Jacobs, and B.W. Wolf. 1996. Determination of fructooligosaccharides in selected feeds using ion chromatography. *FASEB J.* 10:A794.
- Zuo, Y., J.M. Campbell, G.C. Fahey, Jr., N.R. Merchen, and N.L. Bajjalieh. 1996. Digestion responses to low oligosaccharide soybean meal incorporation into diets of ileal cannulated dogs. *J. Anim. Sci.* 74(Suppl. 1):186.
- Campbell, J.M., G.C. Fahey, Jr. and C.A. Lichtensteiger. 1997. Assessment of inflammation (granulomatous colitis) induced by intramural injection of peptidoglycan-polysaccharide or Freund's adjuvant in the colon of the pig. *FASEB J.* 11:A581.
- Hussein, H.S., J.M. Campbell, L.L. Bauer, G.C. Fahey, Jr., L. Hogarth, and B.W. Wolf. 1997. Fructooligosaccharide composition of petfood ingredients. *Waltham International Symposium on Pet Nutrition and Health.*
- Arthington, J.D., T.L. Brown, J.M. Campbell, E.M. Weaver, L.E. Russell, and F. Chi. 1998. USDA edible, red-blood cell based milk replacer do not potentiate the growth of selected bacteria *in vitro*. *J. Anim. Sci.* 76(Suppl. 1):263.
- Campbell, J.M., E.M. Weaver, L.E. Russell, F. Chi, and J.D. Arthington. 1998. Evaluation of dietary inclusion of spray-dried plasma proteins (AP 920 and Appetin) on pig performance throughout the nursery. *J. Anim. Sci.* 76(Suppl. 1):180.
- Campbell, J.M., E.M. Weaver, L.E. Russell, F. Chi, and J.D. Arthington. 1998. Impact of spray-dried plasma proteins (Appetitein and AP 920) on postweaning pig growth performance. *J. Anim. Sci.* 76(Suppl. 1): 180.
- Borg, B.S., J.M. Campbell, L.E. Russell, D.U. Thomson, and E.M. Weaver. 1999. Effects of water soluble globulin on the performance of weanling pigs. *J. Anim. Sci.* 77(Suppl. 1):193.

- Miller, S.J., J.D. Arthington, J.M. Campbell, B.S. Borg, and D.M. Webel. 1999. Effect of porcine serum concentrate on growth performance and mortality in young pigs. *J. Anim. Sci.* 77(Suppl. 1):56.
- Steidinger, M.U., R.D. Goodband, M.D. Tokach, J.L. Nelssen, L.J. McKinney, J.C. Woodworth, B.S. Borg, and J.M. Campbell. 1999. Effects of increasing pellet conditioning temperature of diets containing spray-dried animal plasma on weanling pig performance. *J. Anim. Sci.* 77(Suppl. 1):193.
- Harrell, R.J., H.K. Moon, E.M. Weaver, J.M. Campbell, J.A. Arthington, and J. Odle. 2000. Effects of animal plasma proteins on intestinal recovery of neonatal pigs infected with rotavirus. *FASEB J.* 14:A728.
- Steidinger, M.U., R.D. Goodband, M.D. Tokach, J.L. Nelssen, S.S. Dritz, B. Borg, and J. Campbell. 2000. Effects of water-soluble globulin on the growth performance of weanling pigs fed different diet complexities. *J. Anim. Sci.* 78(Suppl. 1):43.
- Campbell, J., B. Borg, R. Gatnau. 2000. Effect of spray-dried plasma in different diet compositions on weanling pig performance. *EAAP 51st Annual Meeting, The Hague.* P5.4, pp. 343.
- Campbell, J.M., B.S. Borg, L.E. Russell, J. Polo, and J. Pujols. 2001. Biosecurity measures of spray-dried plasma protein in weanling pigs. *J. Anim. Sci.* 79(Suppl. 1):190.
- Campbell, J.M. and T.M. Wolfe. 2002. Efficacy of water-soluble serum on broiler performance under different environments. *23rd Annual Meeting of Southern Poultry Science Society.* p. 12.
- Chamblee, T.N., M.T. Kidd, J.B. Yeatman, C.D. Schultz, and J.M. Campbell. 2002. Evaluation of water-soluble serum in the drinking water of broilers. *23rd Annual Meeting of Southern Poultry Science Society.* p. 12.
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- Campbell, J.M., J.D. Quigley, L.E. Russell, and L.A. Koehn. 2003. Impact of spray-dried bovine serum on mortality and performance of turkeys challenged with *Pasteurella multocida*. *J. Anim. Sci.* 81(Suppl. 1):48.
- Bregendahl, K., D. Ahn, D. Trampel, J. Campbell, and J. Crenshaw. 2004. Dietary spray-dried plasma protein improves feed utilization, BW uniformity, and breast-meat yield of broilers raised in a relatively unsanitary environment. *J. Anim. Sci.* 82(Suppl. 1):316.
- Hammer, C.J., J.D. Quigley, J.M. Campbell, J.D. Crenshaw, and L.E. Russell. 2004. Digestibility of dry dog kibble containing spray dried animal plasma. *J. Anim. Sci.* 82(Suppl. 1):245.

- Srichana, P., A.M. Gaines, B.W. Ratliff, G.L. Allee, J.D. Crenshaw, J.M. Campbell, J.D. Quigley, and L.E. Russell. 2004. Impact of spray-dried plasma with or without antimicrobials on nursery pig performance. *J. Anim. Sci.* 82(Suppl. 1):140.
- Garriga, C., A. Pérez-Bosque, C. Amat, J.M. Campbell, J.D. Quigley, J. Polo, and M. Moretó. 2004. Effects of diets supplemented with animal plasma and immunoglobulin concentrate on intestinal transport of glucose and amino acids in rats challenged with the *Staphylococcus aureus* enterotoxin B. *J. Physiol. Biochem.* 60:164.
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Patents Granted

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- Russell, L., J.M. Campbell, and F.J.P. Pozo. Jun. 15, 2004. Heme supplement and method of using same. United States Patent Number: 6,749,872.

Technical Reports

- Campbell, J.M., W.R. Rose, and M.R. Murphy. 1992. In vitro estimation of ruminal volatile fatty acid production rate in dairy cattle. *Illinois Dairy Report*. pp 72-74.
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